WHAT IS CLAIMED IS:

1. An isolated nucleic acid molecule comprising a polynucleotide having a nucleotide sequence selected from the group consisting of:

(a) a polynucleotide fragment of SEQ ID NO:1 or a polynucleotide fragment of the cDNA sequence included in ATCC Deposit No: XXXXX, which is hybridizable to SEQ ID NO:1;

(b) a polynucleotide encoding a polypeptide fragment of SEQ ID NO:2 or a polypeptide fragment encoded by the cDNA sequence included in ATCC Deposit No: XXXXX, which is hybridizable to SEQ ID NO:1;

(c) a polynucleotide encoding a polypeptide domain of SEQ ID NO:2 or a polypeptide domain encoded by the cDNA sequence included in ATCC Deposit No: XXXXX, which is hybridizable to SEQ ID NO:1;

(d) a polynucleotide encoding a polypeptide epitope of SEQ ID NO:2 or a polypeptide epitope encoded by the cDNA sequence included in ATCC Deposit No: XXXXX, which is hybridizable to SEQ ID NO:1;

(e) a polynucleotide encoding a polypeptide of SEQ ID NO:2 or the cDNA sequence included in ATCC Deposit No: XXXXX, which is hybridizable to SEQ ID NO:1, having ligand-gated cation channel activity;

(f) a polynucleotide which is a variant of SEQ ID NO:1;

(g) a polynucleotide which is an allelic variant of SEQ ID NO:1;

(h) an isolated polynucleotide comprising nucleotides 4 to 1518 of SEQ ID NO:1, wherein said nucleotides encode a polypeptide corresponding to amino acids 2 to 506 of SEQ ID NO:2 minus the start methionine;

(i) an isolated polynucleotide comprising nucleotides 1 to 1518 of SEQ ID NO:1, wherein said nucleotides encode a polypeptide corresponding to amino acids 2 to 506 of SEQ ID NO:2 including the start codon;

(j) a polynucleotide which represents the complimentary sequence of SEQ ID NO:1; and

(k) a polynucleotide capable of hybridizing under stringent conditions to any one of the polynucleotides specified in (a)-(j), wherein said polynucleotide does not hybridize under stringent conditions to a nucleic acid molecule having a nucleotide sequence of only A residues or of only T residues.

2. The isolated nucleic acid molecule of claim 1, wherein the polynucleotide fragment consists of a nucleotide sequence encoding a human ligand-gated cation channel.

3. A recombinant vector comprising the isolated nucleic acid molecule of claim 1.

4. A recombinant host cell comprising the vector sequences of claim 3.

5. An isolated polypeptide comprising an amino acid sequence selected from the group consisting of:

(a) a polypeptide fragment of SEQ ID NO:2 or the encoded sequence included in ATCC Deposit No: XXXXX;

(b) a polypeptide fragment of SEQ ID NO:2 or the encoded sequence included in ATCC Deposit No: XXXXX, having ligand-gated cation channel activity;

(c) a polypeptide domain of SEQ ID NO:2 or the encoded sequence included in ATCC Deposit No: XXXXX;

(d) a polypeptide epitope of SEQ ID NO:2 or the encoded sequence included in ATCC Deposit No: XXXXX;

(e) a full length protein of SEQ ID NO:2 or the encoded sequence included in ATCC Deposit No: XXXXX;

(f) a polypeptide comprising amino acids 2 to 506 of SEQ ID NO:2, wherein said amino acids 2 to 506 comprising a polypeptide of SEQ ID NO:2 minus the start methionine;

(g) a polypeptide comprising amino acids 1 to 506 of SEQ ID NO:2.

6. The isolated polypeptide of claim 5, wherein the full length protein comprises sequential amino acid deletions from either the C-terminus or the N-terminus.

7. An isolated antibody that binds specifically to the isolated polypeptide of claim 5.

8. A recombinant host cell that expresses the isolated polypeptide of claim 5.

9. A method of making an isolated polypeptide comprising:

(a) culturing the recombinant host cell of claim 8 under conditions such that said polypeptide is expressed; and

(b) recovering said polypeptide.

10. The polypeptide produced by claim 9.

11. A method for preventing, treating, or ameliorating a medical condition, comprising the step of administering to a mammalian subject a therapeutically effective amount of the polypeptide of claim 5, or a modulator thereof.

12. A method of diagnosing a pathological condition or a susceptibility to a pathological condition in a subject comprising:

(a) determining the presence or absence of a mutation in the polynucleotide of claim 1; and

(b) diagnosing a pathological condition or a susceptibility to a pathological condition based on the presence or absence of said mutation.

13. A method of diagnosing a pathological condition or a susceptibility to a pathological condition in a subject comprising:

(a) determining the presence or amount of expression of the polypeptide of claim 5 in a ligand-gated cation channel sample; and

(b) diagnosing a pathological condition or a susceptibility to a pathological condition based on the presence or amount of expression of the polypeptide.

14. An isolated nucleic acid molecule consisting of a polynucleotide having a nucleotide sequence selected from the group consisting of:

(a) a polynucleotide encoding a polypeptide of SEQ ID NO:2;

(b) an isolated polynucleotide consisting of nucleotides 4 to 1518 of SEQ ID NO:1, wherein said nucleotides encode a polypeptide corresponding to amino acids 2 to 506 of SEQ ID NO:2 minus the start codon;

(c) an isolated polynucleotide consisting of nucleotides 1 to 1518 of SEQ ID NO:1, wherein said nucleotides encode a polypeptide corresponding to amino acids 1 to 506 of SEQ ID NO:2 including the start codon;

(d) a polynucleotide encoding the HBMYP2X7v polypeptide encoded by the cDNA clone contained in ATCC Deposit No. XXXXX;

(e) a polynucleotide which represents the complimentary sequence of SEQ ID NO:1.

15. The isolated nucleic acid molecule of claim 14, wherein the polynucleotide comprises a nucleotide sequence encoding a human ligand-gated cation channel.

16. A recombinant vector comprising the isolated nucleic acid molecule of claim 15.

17. A recombinant host cell comprising the recombinant vector of claim 16.

18. An isolated polypeptide consisting of an amino acid sequence selected from the group consisting of:

(a) a polypeptide fragment of SEQ ID NO:2 having ligand-gated cation channel activity;

(b) a polypeptide domain of SEQ ID NO:2 having ligand-gated cation channel activity;

(c) a full length protein of SEQ ID NO:2;

(d) a polypeptide corresponding to amino acids 2 to 506 of SEQ ID NO:2, wherein said amino acids 2 to 506 consisting of a polypeptide of SEQ ID NO:2 minus the start methionine;

(e) a polypeptide corresponding to amino acids 1 to 506 of SEQ ID NO:2;

(f) a polypeptide encoded by the cDNA contained in ATCC Deposit No. XXXXX.

19. The method of diagnosing a pathological condition of claim 13 wherein the condition is a member of the group consisting of: a disorder related to aberrant cation channel activity and/or expression; a disorder related to aberrant ligand-gated cation channel activity and/or expression; a neural disorder; a neural disorder directly; or indirectly; linked to aberrant purinoceptor activity; a neural disorder directly; or indirectly; linked to aberrant P2X activity; a neural disorder related to aberrant small cation flux; a neurodegenerative disorder; a memory disorder; a Alzheimer's disease; an obsessive/compulsive disorder; an addiction; a disorder related to aberrant dopamine regulation; a disorder related to aberrant serotonin regulation; dysphoria; depression; irritability and anxiety associated with treating various drug addiction; Alzheimers; learning; disorders associated with the aberrant establishment of long term potentiation; disorders associated with aberrant

hippocampus function; memory and affective disorders; dry eye; cystic fibrosis; retinal detachment; retinal edema; arterial thrombosis; and platelet aggregation; antiinflammatory conditions; and rheumatoid arthritis; cerebral ischaemia; Parkinson's disease; Huntigton's disease; disorders involving aberrant release of GABA; disorders involving aberrant release of glutamate; neurodegenerative disorders; disorders involving aberrant microglial activation; disorders involving aberrant astrocyte activation; excitotoxicity disorders; disorders associated with aberrant ATP-dependent lysis of macrophages or other immune cells; aberrant formation of cellular membrane pores permeable to large molecules; disorders associated with aberrant fast synaptic transmission; disorders associated with aberrant ATP-mediated lysis of antigen-presenting cells; disorders associated with aberrant apoptosis activation; and disorders involving aberrant nitric oxide synthesis.

20. The method for preventing, treating, or ameliorating a medical condition of claim 11, wherein the medical condition is selected from the group consisting of: a disorder related to aberrant cation channel activity and/or expression; a disorder related to aberrant ligand-gated cation channel activity and/or expression; a neural disorder; a neural disorder directly; or indirectly; linked to aberrant purinoceptor activity; a neural disorder directly; or indirectly; linked to aberrant P2X activity; a neural disorder related to aberrant small cation flux; a neurodegenerative disorder; a memory disorder; a Alzheimer's disease; an obsessive/compulsive disorder; an addiction; a disorder related to aberrant dopamine regulation; a disorder related to aberrant serotonin regulation; dysphoria; depression; irritability and anxiety associated with treating various drug addiction; Alzheimers; learning; disorders associated with the aberrant establishment of long term potentiation; disorders associated with aberrant hippocampus function; memory and affective disorders; dry eye; cystic fibrosis; retinal detachment; retinal edema; arterial thrombosis; and platelet aggregation; antiinflammatory conditions; and rheumatoid arthritis; cerebral ischaemia; Parkinson's disease; Huntigton's disease; disorders involving aberrant release of GABA; disorders involving aberrant release of glutamate; neurodegenerative disorders; disorders involving aberrant microglial activation; disorders involving aberrant astrocyte activation; excitotoxicity disorders; disorders associated with aberrant ATP-dependent lysis of macrophages or other immune cells;

aberrant formation of cellular membrane pores permeable to large molecules; disorders associated with aberrant fast synaptic transmission; disorders associated with aberrant ATP-mediated lysis of antigen-presenting cells; disorders associated with aberrant apoptosis activation; and disorders involving aberrant nitric oxide synthesis.